Cliff A. Joslyn

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RESEARCH

Systems Science and Cybernetics; Computational Semiotics and Semiotic Modeling; Knowledge Representation; Generalized Information Theory (GIT) and Uncertainty Quantification; Possibility Theory and Fuzzy Systems; Inductive Modeling and Data Mining; Biological Semiotics; Cybernetic Philosophy.

EDUCATION

- **PhD 1994 in Systems Science, SUNY at Binghamton**
  Dissertation: *Possibilistic Processes for Complex Systems Modeling*, **Advisor:** George Klir
- **MS 1989 in Systems Science, SUNY at Binghamton**
  Theoretical information systems architecture and analysis.
- **BA 1985 in Mathematics and Cognitive Science, Oberlin College**
  High Honors: Cybernetics and Cognitive Science.
  Systems Theory, Semiotics, Linguistics, Philosophy, Artificial Intelligence; minor in Religion.

CURRENT POSITIONS

Team Leader, Knowledge Systems and Computational Biology
Modeling, Algorithms, and Informatics Group (CCS-3)
Los Alamos National Laboratory, Los Alamos, New Mexico

Technical and supervisory leadership of team of research scientists; knoweldge representation; knowledge networks; computational linguistics; applications in computational biology, homeland defense, and digital libraries.

Visiting Professor, Civil Engineering
University of New Mexico, Albuquerque, New Mexico

RESEARCH POSITIONS

- **Acting Team Leader, Los Alamos National Laboratory, 2000-2002**
  Distributed Knowledge Systems and Modeling Team; Modeling, Algorithms, and Informatics Group (CCS-3). Leadership in research projects in distributed knowledge systems, bioinformatics, data mining, and agent-based modeling of sociotechnical systems.
- **Member of the Technical Staff, Los Alamos National Laboratory, 1998-1999**
  Research and development in distributed knowledge systems, data mining applications, and agent-based modeling of sociotechnical systems.
- **Postdoctoral Research Associate, Los Alamos National Laboratory, 1996-1998**
  Data mining for fraud detection; guided multidimensional discovery in relational databases; generalized information measures.
- **NSF Postdoctoral Research Associate, NASA Goddard Space Flight Center, 1994-1996**
  Qualitative modeling systems: fundamental classes for possibilistic modeling; support for spacecraft diagnostics and trend analysis; Data Analysis and Systems Modeling Environment (DASME); Discrete EVent Systems (DEVS) Modeling.
- **Graduate Fellow, NASA Goddard Space Flight Center, 1991-1994**
  Graduate Fellowship in support of dissertation research: possibilistic qualitative modeling, model-based diagnosis of spacecraft systems.

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TEACHING APPOINTMENTS

- **Adjunct Instructor, Computer Science, University of New Mexico, Los Alamos, 1997**
  Instructor for "Introduction to UNIX" and "Advanced UNIX".
- **Instructor, Southern Maine Technical College, South Portland, Maine, Spring 1993**
  Designed and taught "Programming in ANSI C".
- **Instructor, AGS Information Services, Endwell, New York, 1990**
  Instructed corporate programming staff in the ANSI C programming language.
- **Instructor and Teaching Assistant, SUNY at Binghamton, 1987-1991:**
    - **Continuing Education, Course Design and Instruction** ANSI C Programming.
    - **Systems Science Department, Course Design and Instruction** Fundamentals of Mathematics, Introduction to Systems Science.
    - **Systems Science Department, Teaching Assistance** Artificial Intelligence; Information Systems Design; Inductive Modelling Methodologies (Systems Problem Solving); Systems Optimization; Discrete Structures; microcomputer support.

ADVISING

- **Graduate Student Supervision:** Los Alamos National Laboratory, 1996-present, instructed, supervised, and advised multiple Graduate Assistants on research and software systems development.
- **PhD Committee:** Gregory Chavez, Department of Civil Engineering, University of New Mexico.
- **PhD Committee:** Kari Sentz, Systems Science and Industrial Engineering, Binghamton University
- **MS Committee:** Gregory Chavez, *Optimization of Possibility Distribution Algorithms*, Department of Civil Engineering, University of New Mexico, 2002.
- **PhD Committee:** Johan Bollen, *A Cognitive Model of Adaptive Web Design and Navigation*, Department of Psychology, Free University of Brussels, 2001.
- **MS Committee:** Thomas Prang, *Unsupervised Data Mining in Nominally Supported Databases*, Department of Systems Science and Industrial Engineering, Binghamton University, 1998.

FUNDING

- **Los Alamos National Laboratory Directed Research and Development:** *Protein Function Inference*, 2002-present.
- **Los Alamos National Laboratory, Industrial Business Development:** *Cooperative Research And Development Agreement on Knowledge Systems for Bioinformatics, Proctor & Gamble*, 2002-present.
- **Sandia National Lab, ASCI Program:** *Epistemic Uncertainty Modeling*, September, 2000-present.
- **Los Alamos National Laboratory, Research Library:** *Active Recommendation Systems for a Library Without Walls*, January, 1999-present.
- **Los Alamos National Laboratory Directed Research and Development:** *Advanced Knowledge Integration In Assessing Terrorist Threats*, 2002.
- **Los Alamos National Laboratory, Industrial Business Development:** *Cooperative Research And Development Agreement on Knowledge Management, Xerox Corporation*, 2000-2001.
- **Physical Science Laboratory, New Mexico State University:** *Decision Structures of Socio-Technical Organizations*, 1999-2000.
- **National Academy of Sciences Postdoctoral Research Awards:**
    - **NASA Goddard Space Flight Center** *Possibilistic Qualitative Model-Based Diagnosis and Trend Analysis of Spacecraft Systems*, Contract # NASW 4352, 1994-1996.
    - **NIST Statistical Engineering Laboratory** *Possibilistic Representations of Measurement Combination Problems*, awarded simultaneously, declined.

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HONORS AND AWARDS

- **Distinguished Performance Award:** Large Team Award for IRS Fraud Detection Project, Los Alamos National Laboratory, September 1997.
- **Graduate Student Researchers Program Fellowship:** NASA Goddard Space Flight Center, 1991-1994. Advisor: Walter Truszkowski.
- **Dissertation Year Fellowship:** SUNY at Binghamton, 1991, declined.
- **Vickers Memorial Award:** International Society for the Systems Sciences, 1991; Member, Vickers Memorial Honorary Society, Vickers Award Selection Committee.
- **Conference Scholarship:** Gordon Research Conference on Control and Communications in Complex Systems, 1990.
- **High Honors:** Studies in Systems Science and Cognitive Science, Oberlin College, 1985.
- **Independent Major:** Cognitive Science, Oberlin College, 1983-1985.

PEER REVIEW

Journals

- **Editorial Board:** *International Journal of General Systems; Advances in Complex Systems*
- **Referee:**
  - *Biosystems; Complexity International; Systems Research; Foundations of Science;*
  - *Computational and Mathematical Organization Theory; Information Sciences;*
  - *IEEE Trans. on Fuzzy Systems; IEEE Trans. on Systems, Man, and Cybernetics;*
  - *Int. J. of Fuzzy Sets and Systems; Reliability Engineering and System Safety;*
  - *Int. J. of Uncertainty, Fuzziness, and Knowledge-Based Systems*
  - *Int. J. of Human-Computer Studies; Society for Computer Simulation Trans. on Simulation*

Panels

- **Los Alamos National Laboratory:** Laboratory Directed Research and Development (LDRD), Computer Science and Software Engineering, Exploratory Research (ER) panel, 2001-present.
- **University of California Discovery Grants:** Life Sciences and Information Technology Program, 2003.
- **Pacific Northwest National Laboratory:** Laboratory Directed Research and Development (LDRD), external reviewer in Computational Science and Engineering Initiative, 2002.
- **Netherlands Organisation for Scientific Research:** Research Programme for the Cognitive Sciences, 2002.
- **National Science Foundation:** Information Technology Research (ITR) Initiative, 2001.

Conferences

- **Program Committee:** 2003 International Symposium of Uncertainty Modeling and Analysis (ISUMA 03), University of Maryland, September, 2003.
- **Program Committee:** Workshop on "Distributed Computing Architectures for Digital Libraries", 31th International Conference on Parallel Processing (ICPP), August, 2002.
- **International Advisory Board:** 2002 Workshop on Performance Metrics for Intelligent Systems, National Institute of Standards and Technology, Gaithersburg, MD, August, 2002.
- **Program Committee:** Workshop on Epistemic Uncertainty, Sandia National Laboratory, August, 2002
- **Program Committee:** 2002 Conference on AI, Simulation and Planning, Lisbon, April, 2002
- **Program Committee:** Workshop on "Theoretical Fundamentals of Intelligent Systems: Computational Semiotics", Joint Conference on Information Systems, Duke University, March 2002

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- **Workshop Chair:** Los Alamos Workshop on Novel Approaches to Uncertainty Quantification, February, 2002.
- **Program Committee:** 2002 World Congress on Virtual Worlds and Simulation, San Antonio, January, 2002.
- **Executive and Scientific Committees:** First International Conference on Intelligent Networks and Social Evolution (Global Brain 1), Brussels, July 2001
- **International Advisory Board:** 2000 Workshop on Performance Metrics for Intelligent Systems, National Instiute of Standards and Technology, Gaithersburg, MD, August, 2000.
- **Program Committee:** 2000 World Congress on the Systems Sciences, Toronto, July, 2000.
- **Program Committee:** 2000 Conference on AI, Simulation and Planning, University of Arizona, Tucson, March, 2000.
- **Program Committee:** 1999 IEEE International Symposium on Computational Intelligence in Robotics and Automation, Monterey, California, 1999.
- **Program Committee, Workshop Co-Chair:** Workshop on "Semiotics of Autonomous Information Systems", 1998 Conference on Intelligent Systems and Semiotics, National Institute of Standards and Technology, Gaithersburg, Maryland, September, 1998.
- **Workshop Organizer and Co-Chair:** Workshop on Emergent Semantic and Computational Processes in Distributed Information Systems, Los Alamos National Laboratory, Los Alamos, New Mexico, August, 1998.
- **International Program Committee, Workshop Chair:** Workshop on "Semiotic Methods of Information and Knowledge Processing", 1997 Conference on Intelligent Systems and Semiotics, National Institute of Standards and Technology, Gaithersburg, Maryland, September, 1997.
- **Program Committee, Workshop Chair:** Workshop on "Uncertainty Representation in Decision-Making Systems", conference on *Intelligent Systems: A Semiotic Perspective*, National Institute of Standards and Technology, Gaithersburg, Maryland, October, 1996.
- **Program Committee:** Thirteenth European Meeting on Cybernetics and Systems Research; co-chair, Symposium on Systems Methodology; Vienna, April 1996.
- **Program Committee:** Conference on AI, Simulation and Planning in High Autonomy Systems, San Diego, March 1996.
- **Organizing Committee:** 1996 Conference of the Washington Evolutionary Systems Society.
- **Organizing and Scientific Committees:** International Workshop on the Foundations and Applications of Possibility Theory (FAPT '95), University of Ghent, December, 1995.

RESEARCH PROJECTS

- **Protein Functino Inference:** Research in metrics in spaces of biological functions, Los Alamos National Laboratory Directed Research and Development, 2002–present.
- **Cellular Pathway Discovery Through Natural Language Knowledge Systems:** Principle Investigator for Knowledge Systems, Cooperative Research And Development Agreement on Knowledge Management, Proctor & Gamble Corporation. 2002–present.
- **Epistemic Uncertainty Modeling:** Principle Investigator: Integrated Contractor Order with Sandia National Laboratory, 2000–present.
- **Active Recommendation Systems for a Library Without Walls:** Adaptive semantic information systems for recommendation in computer-human interactive library systems. 1999–present.
- **Principia Cybernetica Project:** Founder and Member of the Editorial Board for this project in the collaborative development of a distributed hypertext corpus for evolutionary theory and cybernetic philosophy, `http://pcp.vub.ac.be`, 1989–present.
- **Advanced Knowledge Integration In Assessing Terrorist Threats:** Principle Investigator for Computer Science, Los Alamos National Laboratory Directed Research and Development, 2002.
- **Knowldege Management CRADA:** Principle Investigator: Cooperative Research And Development Agreement on Knowledge Management, Xerox Corporation. 2000–2001.

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- **Decision Structures of Socio-Technical Organizations:** Principle Investigator: Modeling of agent community interaction with sociotechnical systems for a Government customer. Swarm. 1999–2000.
- **Electronic Fraud Detection System (EFDS):** Data mining algorithms for fraud detection in IRS electronically filed tax returns. UNIX/C, Matlab/S+, ProC/PL-SQL/Oracle, X/Motif. 1996-1999.
- **Computer-Aided Systems Theory–General Information Theory (CAST-GIT):** Classes for random sets; possibilistic distributions and histograms; and both general and possibilistic processes. UNIX, Centerline C++, Booch Components. 1992-1996.
- **Data Analysis and Systems Modeling Envrionment (DASME):** Project leader, Discrete EVent Systems (DEVS) modeling, possibilistic measurement. NASA Goddard Space Flight Center. UNIX, X-Windows, Motif, Centerline C++, Booch components. 1994-1996.
- `CYBSYS-L@BINGVMB.CC.BINGHAMTON.EDU`: Founder and moderator of this Electronic Mailing List for Systems Science and Cybernetics. `Internet/BITNET/LISTSERV`, 1989-1994.

INVITED PRESENTATIONS

- "Meta-System Transition Theory" (with Valentin Turchin and Ben Goertzel), "Semiotic Closures and Autonomic Systems", "Semiotic Agent Systems and Second Order Cybernetics", Autonomic Computing Summit, IBM Academy of Technology, IBM TJ Watson Research Center, Yorktown Heights, New York, May, 2002.
- "Systems Science via Computational Semiotics and Generalized Information Theory", Center for Intelligent Systems, Binghamton University, Binghamton, New York, May, 2002.
- "Novel Uncertainty Quantification Methods Based on Generalized Information Theory", Uncertainty Quantification Working Group, Los Alamos National Laboratory, Los Alamos, New Mexico, March, 2002.
- "Network Worlds: From Link Analysis to Virtual Places", 2002 Workshop on Virtual Worlds and Simulation (VWSim02), San Antonio, Texas, January, 2002.
- "Systems Concepts for the Simulation of Ultra-Large Networks", NSF Workshop on Modeling and Simulation of Ultra-Large Networks, November, 2001.
- "What Could We Mean By An 'Intelligent Web' ", Second `en.red.ando` Conference on the Intelligent Web, Barcelona, October, 2001.
- "How Distributed Knowledge Systems Facilitate Social Control in Semiotic Agent-Based Architectures", Workshop on Intelligent Networks and Social Evolution, Free University of Brussels, July, 2001.
- "A Semiotic Systems Approach to Knowledge Integration Environments and Technologies", National Security Agency, Fort Meade, MD, February, 2001.
- "A Semiotic Critique of the Limits of Formal Models", 2001 Workshop on Virtual Worlds and Simulation (VWSim01), Phoenix, Arizona, January, 2001.
- "A Semiotic Systems Approach to Distributed Knowledge Environments", Working group on a Distributed Knowledge Repository, SRI International AI Lab, Menlo Park, CA, July, 2000.
- "Agent Modeling from a Semiotic Perspective", Dagstuhl seminar on Agent-Oriented Software Approaches in Distributed Modeling and Simulation, Dagstuhl Castle, Germany, July, 1999.
- "Beyond Classical Information Theory: Non-Probabilistic and Semiotic Approaches to Representing Information Systems", post-graduate course on Information Warfare, Independent University; National Defense Institute; Lisbon, May, 1999.
- "Levels of Control and Closure in Complex Semiotic Systems", 7th Annual Washington Evolutionary Systems Conference, Ghent, Belgium, May 1999.
- "Semiotics in Systems Theory: What We've Been Missing", Washington Evolutionary Systems Society Microsymposium on Semiotics in Science and Engineering, Washington, DC, September 1998.
- "Empirical Approaches to General Information Theory", Department of Statistics, University of New Mexico, February 1997.
- "Semiotic Aspects of Control and Modeling Relations in Complex Systems", 1996 Workshop on Control Mechanisms for Complex Systems, New Mexico State University, December 1996.

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- "Information Systems Applications from the Systems Scientific Perspective", Applied Research Laboratory, Pennsylvania State University, March 1996.
- "General Information Theory and Cybernetic Modeling", Computer Research and Applications Group, Los Alamos National Lab, New Mexico, February 1996.
- "The Systems Science Approach to Interdisciplinary Studies", Center Leo Apostel, Free University of Brussels, December 1995.
- "The Principia Cybernetica Project for Evolutionary and Cybernetic Theory", Washington Evolutionary Systems Society, Washington, DC, November 1995.
- "Two Concepts of Variety in Systems Descriptions", Center for Social and Organizational Learning, George Washington University, Washington, DC, September 1995.
- "Qualitative and Possibilistic Modeling", Center for Social and Organizational Learning, George Washington University, Washington, DC, March 1995.
- "Possibilistic and Fuzzy Modeling", Special Interest Group on Artificial Intelligence, NASA Goddard Space Flight Center, Greenbelt, Maryland, November 1994.
- "Possibility Theory and Possibilistic Automata", Department of Systems Science, Johannes Kepler University, Linz, Austria, July 1991.

BUSINESS EXPERIENCE

- **Software Consultant:** ABB Environmental, Portland, Maine, Summer 1994.
  Design, maintenance, and project management of leading air quality industrial emissions tracking system. FoxPro, Windows 3.1
- **Computer Consultant:** Binghamton, New York, 1987-1994.
  Small business information systems design and development.
- **Computer Manager:** Pryme-Line Distributors, Binghamton, New York, 1987-1991.
- **Software Engineer:** Computer Consoles Inc., Reston, Virginia, 1986-1987.
- **Systems Analyst:** Contractors Managment Systems, Reston, Virginia, 1985-1986.

SKILLS

- **Languages:** C++ 2.0, ANSI C; Prolog, LISP, SCHEME; XML; Perl 5, awk, UNIX shells; SQL, Oracle, XBase dialects; HTML, SGML; BASIC; assemblers.
- **Mathematical Programming:** Matlab 5.0; S+; MathCad; Macsyma.
- **Development Environments:** X-Windows, MacX; ProC/PL-SQL, Developer 2000 (Oracle Browser); FoxPro; Rogue Wave, Booch Components.
- **Operating Systems:** Linux 2.4.2; Solaris 2.6, Digital UNIX 4.0, Sun OS 4.1.4, Irix 6.2; Windows NT, 98, 95, 3.1; Mac-OS 8.5; DOS 6.0; VM/CMS.
- **Other Software:** TEX, LATEX2e; VISIO (diagramming); MKS Toolkit; CVS, SCCS, RCS; numerous X-Windows, Microsoft Windows, and Macintosh application programs.

AFFILIATIONS

- North American Fuzzy Information Processing Society (NAFIPS)
- IEEE Society for Systems, Man, and Cybernetics
- Association for Computing Machinery (ACM)
- Society for Computer Simulation (SCS)
- International Society for the Systems Sciences (ISSS)
- Washington Evolutionary Systems Society (WESS)
- Control Systems Group (CSG)
- American Society for Cybernetics (ASC)

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PUBLICATIONS

Long Publications

- *Possibilistic Processes for Complex Systems Modeling*, Binghamton University (SUNY), PhD Thesis, UMI Dissertation Services Publication # 9434056, 1994. Abstract: *Dissertation Abstract Index*, v. 55-08B.

- (With Francis Heylighen and Valentin Turchin, editors) *The Quantum of Evolution: Towards a Theory of Meta-System Transitions*, Gordon and Breach, New York, 1995. (Special issue of *World Futures: The Journal of General Evolution*, v. **45**:1)

Journal Papers

- (With Valentin Turchin) "The Cybernetic Manifesto", *Kybernetes,* **19**:2, pp. 63-64, 1990.

- "On the Semantics of Entropy Measures of Emergent Phenomena", *Cybernetics and Systems,* v. **22**:6, pp. 631-640, 1991.

- (With Francis Heylighen and Valentin Turchin) "A Short Introduction to the Principia Cybernetica Project", *Journal of Ideas*, v. **2**:1, pp. 26-29, 1991.

- (With Francis Heylighen) "Electronic Networking for Philosophical Development in the Principia Cybernetica Project", *Informatica*, v. **17**:3, pp. 285-293, 1993.

- "A Possibilistic Approach to Qualitative Model-Based Diagnosis", *Telematics and Informatics*, v. **11**:4, pp. 365-384, 1994.

- "Semantic Control Systems", *World Futures*, v. **45**, pp. 87-123, 1995.

- (With Francis Heylighen) "Towards a Theory of Meta-System Transitions", *World Futures*, v. **45**, pp. 1-4, 1995.

- "Aggregation and Completion of Random Sets with Distributional Fuzzy Measures", *International Journal of Uncertainty, Fuzziness, and Knowledge-Based Systems*, v. **4**:4, pp. 307-329, 1996.

- "Measurement of Possibilistic Histograms from Interval Data", *International Journal of General Systems*, v. **26**:1-2, pp. 9-33, 1997.

- "Possibilistic Normalization of Inconsistent Random Intervals", *Advances in Systems Science and Applications*, special issue, ed. Wansheng Tang, pp. 44-51, 1997.

- (With Luis Rocha) "Towards a Formal Taxonomy of Hybrid Uncertainty Representations", *Information Sciences*, v. **110**:3-4, pp. 255-277, 1998.

- "Levels of Control and Closure in Complex Semiotic Systems", *Annals of the New York Academy of Sciences*, special issue on "Closure", ed. J. Chandler, G. van de Vijver, v. **901**, pp. 67-74, 2000.

- "The Semiotics of Control and Modeling Relations in Complex Systems", *Biosystems*, v. **60**:1-3, pp. 131-48, 2001

- (With WL Oberkampf, JC Helton, SF Wojtkiewicz, and Scott Ferson) "Uncertainty in System Response Given Uncertain Parameters", *Reliability Engineering and Safety Systems*, to appear

- (With Vladik Kreinovich) "Convergence Properties of an Interval Probabilistic Approach to System Reliabilility Estimation", in review for the *Int. J. General Systems*

- (With Scott Ferson) "Convolutions of Representations of Random Intervals", in preparation for *Int. J. Approximate Reasoning*

- (With JC Helton) "Sampling-Based Propagation of Random Sets through Functional Black Boxes", in preparation for *Fuzzy Sets and Systems*

- (With Susan Mniszeiski) "DEEP: Data Exploration through Extension and Projection", in preparation for *Knowledge Discovery and Data Mining*.

Book Chapters

- "Empirical Possibility and Minimal Information Distortion", in: *Fuzzy Logic: State of the Art*, edited by R. Lowen and M. Roubens, Kluwer Academic Publishers, pp. 143-152, 1993. (Invited paper)

- "On Possibilistic Automata", in: *Computer-Aided Systems Theory—EUROCAST '93*, ed. F. Pichler and R. Moreno-Diáz, pp. 231-242, in series: *Lecture Notes in Computer Science # 763*, Springer-Verlag, Berlin, 1994.

- "In Support of an Independent Possibility Theory", in: *Foundations and Applications of Possibility Theory*, eds. G. de Cooman, D. Ruan, E.E. Kerre, pp. 152-164, World Scientific, Singapore, 1995.

- (With Francis Heylighen) "Systems Theory", in: *Cambridge Dictionary of Philosophy*, ed. R. Audi, pp. 784-785, Cambridge University Press, Cambridge MA, 1995.

- (With Scott Henderson) "CAST Extensions to DASME to Support Generalized Information Theory", in: *Computer-Aided Systems Theory—EUROCAST '95*, ed. F. Pichler, pp. 237-252, in series: *Lecture Notes in Computer Science # 1030*, Springer-Verlag, Berlin, 1996.

- "An Object-Oriented Architecture for Possibilistic Models", in: *Computer-Aided Systems Technology*, ed. T. Ören and G. Klir, pp. 80-94, in series: *Lecture Notes in Computer Science # 1105*, Springer-Verlag, Berlin, 1996.

- "Some New Results on Possibilistic Measurement", in: *Fuzziness: An Introduction to Theory and Applications*, ed. Marialuisa Mcallister, SIAM Press, in press. (Originally appeared in: *Proceedings of the 1993 Conference of the North American Fuzzy Information Processing Society*, Allentown Pennsylvania, pp. 227-231, 1993.)

- "Distributional Representations of Random Interval Measurements", in: *Uncertainty Analysis in Engineering and the Sciences*, ed. B. Ayyub and M. Gupta, Kluwer, pp. 37-52, 1997.

- "Are Life and Meaning Coextensive?", in: *Evolutionary Systems*, ed. G. van de Vijvers, pp. 413-422, Kluwer, 1998.

- (With Francis Heylighen) "Cybernetics", in: *Encyclopedia of Computer Science*, ed. J. Hemmendinger, A. Ralston, MacMillan Reference, pp. 372-375, 1999.

- (With Francis Heylighen) "Cybernetics and Second Order Cybernetics", *Encyclopedia of Physical Science and Technology*, Academic Press, in press

- (With Jane Booker) "Mathematical Theories of Uncertainty", to appear in: *Engineering Design Reliability Handbook*, 2002.

Peer-Reviewed Conference Proceedings

- "Notes on the Semantics of Entropy", *Proceedings of the 1989 Conference of the American Society for Cybernetics*, 1989. (Winner, ASC Travel Scholarship Award)

- "Towards an Empirical Semantics of Possibility Through Maximum Uncertainty", *Proceedings of the 4th World Congress of the International Fuzzy Systems Association: Artificial Intelligence*, Free University of Brussels, Belgium, pp. 86-89, 1991.

- "Control Theory and Meta-Systems Theory", in *Workbook of the First Principia Cybernetica Workshop*, ed. Francis Heylighen, Free University of Brussels, Belgium, p. 24-32, 1991.

- "Software Support for Principia Cybernetica Development", in *Workbook of the First Principia Cybernetica Workshop*, ed. Francis Heylighen, Free U. of Brussels, Belgium, pp. 49, 1991.

- "Hierarchy, Strict Hierarchy, and Generalized Information Theory", *Proceedings of the 1991 Conference of the International Society for the Systems Sciences,* Östersund, Sweden, v. 1, pp. 123-132, 1991. (Winner, Vickers Memorial Award for Best Student Paper)

- (With George Klir) "Minimal Information Loss Possibilistic Approximations of Random Sets", in: *Proc. 1992 IEEE Int. Conf. on Fuzzy Systems*, San Diego, IEEE, pp. 1081-1088, 1992.

- "Possibilistic Measurement and Set Statistics", in: *Proceedings of the 1992 Conference of the North American Fuzzy Information Processing Society*, v. **2**, pp. 458-467, 1992.

- "Possibilistic Semantics and Measurement Methods in Complex Systems", in: *Proceedings of the Second International Symposium on Uncertainty Modeling and Analysis*, University of Maryland, ed. Bilal Ayyub, pp. 208-215, IEEE Computer Society, 1993.

- (With Francis Heylighen and Valentin Turchin) "Synopsis of the Principia Cybernetica Project", in: *Proceedings of the 13th International Congress on Cybernetics*, ed. J. Ramaekers, pp. 509-513, International Association of Cybernetics, Namur, Belgium, 1993.

- "Qualitative Model-Based Diagnosis Using Possibility Theory", in: *Proceedings of the 1994 Goddard Conference on Space Applications of Artificial Intelligence*, pp. 269-283, 1994.

- "Aggregation and Completion in Probability and Possibility", in: *Proceedings of the 1994 Joint Conference on Information Systems*, ed. PP Wang, pp. 333-336, Pinehurst NC, 1994.

- "Strong Probabilistic Compatibility of Possibilistic Histograms", in: *Proc. 1995 Joint International Symposium on Uncertainty Modeling and Analysis and Conf. of the North American Fuzzy Information Processing Society*, ed. Bilal Ayyub, pp. 383, A17-A22, IEEE Computer Society Press, Los Alamitos, CA, 1995.

- "The Process Theoretical Approach to Qualitative DEVS", Proc. 1996 Conf. on AI, Simulation, and Planning in High Autonomy Systems, pp. 235-242, San Diego CA.

- "Semantic Webs: A Cyberspatial Representational Form for Cybernetics", in: *Proc. 1996 European Conf. on Cybernetics and Systems Research*, ed. R. Trappl, Vienna, v. **2**, pp. 905-910.

- "Hybrid Methods to Represent Incomplete and Uncertain Information", in: *Proc. 1996 Interdisciplinary Conf. on Intelligent Systems: A Semiotic Perspective*, ed. J. Albus, A. Meystel *et al.*, pp. 133-140, NIST, Gaithersburg MD, 1996.

- "Towards General Information Theoretical Representations of Databases Problems", in: *Proc. 1997 Conf. of the IEEE Society for Systems, Man and Cybernetics*, Orlando, FL, v. 2, pp. 1662-1667, 1997.

- (With Luis Rocha) "Simulations of Evolving Embodied Semiosis: Emergent Semantics in Virtual Environments", in: *Proc. Conf. on Virtual Worlds for Simulation*, pp. 233-238, Society for Computer Simulation, San Diego, 1998.

- "Models, Controls, and Levels of Semiotic Autonomy", in: *Proc. 1998 Conference on Intelligent Systems*, ed. J. Albus and A. Meystel, pp. 747-752, IEEE, Gaithersburg MD, 1998.

- (With Norman Johnson, Steen Rasmussen, Luis Rocha, Steven Smith, and Marianna Kantor) "Symbiotic Intelligence: Self-Organizing Knowledge on Distributed Networks Driven by Human Interaction", *Proc. 6th Conference on Artificial Life*, ed. C. Adami *et al.*, MIT Press, 1998.

- "Formal Designed and Informal Emergent Ontologies in Webs and Multi-User Virtual Environments (MUVEs)", in: *1998 Workshop on Emergent Semantic and Computational Processes in Distribtued Information Systems*, ed. C. Joslyn *et al.*, 1998.

- "Possibilistic Systems Theory Within a General Information Theory", *Proc. 1999 Workshop on Imprecise Probabilities and Their Applications*, ed. G. de Cooman *et al.*, pp. 206-215, 1999.

- (With Luis Rocha) "Towards Semiotic Agent-Based Models of Socio-Technical Organizations", *Proc. AI, Simulation and Planning in High Autonomy Systems*, ed. HS Sarjoughian *et al.*, pp. 70-79, 2000.

- "Virtual Environments as Constraints on Decision-Making in Agent Models of Socio-Technical Organizations", in: *2000 Workshop on Virtual Worlds in Simulation*, ed. K. Bellman and C. Landauer, 2000.

- "Towards Measures of Intelligence Based on Semiotic Control", in press for: *2000 Workshop on Performance Metrics in Intelligent Systems*, ed. A. Meystel, NIST, 2000.

- "Measures of Distortion in Possibilistic Approximations of Consistent Random Sets and Intervals", Proc. *2001 Joint Conf. of the North American Fuzzy Information Processing Society and the International Fuzzy Systems Association*, Vancouver, July, 2001, pp. 1735-1740.

- (With T. Ross and V. Kreinovich) "Assessing the Predictive Accuracy of Complex Simulation Models", Proc. *2001 Joint Conf. of the North American Fuzzy Information Processing Society and the International Fuzzy Systems Association*, Vancouver, July, 2001, pp. 2008-2012, 2001.

- (With Jon C. Helton) "Bounds on Plausibility and Belief of Functionally Propagated Random Sets", in: *Proc. Conf. North American Fuzzy Information Processing Society (NAFIPS 2002)*, pp. 412-417, 2002.

- "Network Worlds: From Link Analysis to Virtual Places", in: *Proc. 2002 Conf. on Virtual Worlds and Simulation*, in press, 2002.

Peer-Reviewed Posters and Presentations

- "What Could We Mean By 'Global Brain': How Distributed Knowledge Systems Facilitate Social Control in Semiotic Agent-Based Architectures", presented at the *Workshop on Intelligent Networks and Social Evolution*, Brussels, 2001

- "Link Anlaysis of Social Meta-Networks", presented at the *2002 Conf. on Computational Analysis of Social and Organizational Systems (CASOS 02)*, 2002,
  `ftp://ftp.c3.lanl.gov/pub/users/joslyn/casos02_abs.pdf`

- "The Bio-Ontological Challenge: Representations of, and Measures in, Lattice-Valued Spaces", presented at the *2002 Workshop on Enabling Concepts for Systems Biological Modeling*, Santa Fe, 2002, `ftp://ftp.c3.lanl.gov/pub/users/joslyn/enablingf.pdf`

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